

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of March 16, 2005 is respectfully requested.

In view of the Amendment filed December 20, 2004, claims 14-27 were pending and considered by the Examiner in the outstanding Office Action. In particular, claims 14 and 15 were rejected as being unpatentable over the Yamamoto reference (USP 6,032,630) in view of the Nakajima reference (USP 5,389,452); claims 16, 18-21, and 23 were rejected as being unpatentable over the Yamamoto reference in view of the Nakajima reference, and further in view of the Anno reference (USP 5,204,890); claims 17, 22, and 27 were rejected as being unpatentable over the Yamamoto reference in view of the Nakajima reference and further in view of the Mizuno reference (JP 4-8129938A); claim 24 was rejected as being unpatentable over the Yamamoto reference in view of the Nakajima reference, and further in view of the Lust reference (USP 6,592,356); and claims 25 and 26 were rejected as being unpatentable over the Yamamoto reference in view of the Nakajima reference, and further in view of the Christini reference (USP 3,936,577). However, as discussed with the Examiner during the interview of July 6, 2005, the claims have now been amended as indicated above. For the reasons discussed below, it is respectfully submitted that the amended claims are clearly patentable over the prior art of record.

As explained to the Examiner during the interview of July 6, the claims have now been amended so as to incorporate the subject matter of original base independent claim 14 into each of original dependent claims 16-19. Thus, this application now includes four amended independent claims 16-19. Each of the amended independent claims is directed to a lash adjuster for use in a valve gear, comprising a nut member on a lifter body and having female threads, and an adjuster screw having peripheral male threads engaging the female threads of the nut member. The pressure-side thread surface of one or both of the adjuster screw and the nut member is formed of a material that will not react with oil additives of oil containing organic molybdenum so as to suppress formation of a tribochemical reactive layer between the thread surfaces.

As also explained during the interview, it is the *combination* of features mentioned above and recited within each of amended independent claims 16-19 which provides a lash adjuster

with greatly improved performance. An explanation of these advantages, with reference to various portions of the present application, will now be provided for the Examiner's benefit.

As briefly explained in paragraphs [0005] and [0006] of the substitute specification, an adjuster screw in a lash adjuster is used to compensate for any change in the distance between a valve stem and a camshaft in an internal combustion engine. In other words, the adjuster screw will move slightly in an axial direction while rotating along the threads of the nut member (i.e., being threaded into or out of the nut member), and an elastic member of the lash adjuster biases the adjuster screw to help ensure the proper amount of axial movement. By doing so, the adjuster screw properly compensates for any differences in the distance between the valve stem and the camshaft due to, for example, thermal expansion of the cylinder head.. Consequently, the engine will continue to operate smoothly regardless of changes in the operating conditions.

In order for the adjuster screw to accurately compensate for any changes as described above, the female threads of the nut member and the male threads of the adjuster screw are serration-shaped so as to have pressure flanks acted on by an axial push-in force to be applied by the adjuster screw, and so as to have clearance flanks. The threads are formed so that a flank angle of the pressure flanks is greater than a flank angle of the clearance flanks, as recited in each of amended independent claims 16-19. Thus, a certain friction coefficient can be maintained between the thread surfaces of the adjuster screw and the nut member so as to ensure proper movement of the adjuster screw (see paragraph [0008] of the substitute specification).

Recently, in order to generally reduce friction between components within internal combustion engines, motor oil containing organic molybdenum (i.e., FM oil) has been increasingly used. The FM oil creates a tribochemical reactive film layer between the components, thereby significantly reducing the friction coefficient (see paragraphs [0009] and [0010] of the substitute specification). Thus, friction between components is significantly reduced, so that engine efficiency is improved and engine wear is reduced.

Unfortunately, as explained in paragraph [0011] of the substitute specification, when FM oil is used in an internal combustion engine, the tribochemical reactive film layer causes the friction coefficient between the thread surfaces of the adjuster screw and the nut member to drop

to an excessively low level, thereby causing undesirable slippage between the adjuster screw and the nut member. Thus, the adjuster screw will no longer be able to properly compensate for differences in distances between the valve stem and a camshaft, and engine performance will decrease.

In order to address this problem, the lash adjuster of the present invention has been developed so that the pressure-side thread surface of one or both of the adjuster screw and the nut member is formed of a material that will not react with oil additives or oil containing organic molybdenum so as to suppress formation of a tribochemical reactive layer between the thread surfaces (see paragraph [0019] and [0037]). As a result, the friction coefficient between the thread surfaces of the adjuster screw and the nut member are prevented from falling to an excessively low level, and stable operation of the lash adjuster is maintained.

In item 7 on page 7 of the outstanding Office Action, the Examiner responded to the Applicants' arguments presented in the Amendment filed December 20, 2004. In particular, the Examiner asserted that the features upon which the Applicants relied in the arguments were not recited in the rejected claims. As explained to the Examiner during the interview, however, the Applicants' comments cited by the Examiner in item 7 of the Office Action were meant to explain the advantages obtained by the invention, and emphasize the importance of forming the threads as recited in the claims. In other words, rather than merely pointing out that the claims recite that the pressure-side thread surface is formed of a material that will not react with oil additives of oil containing organic molybdenum, the remarks cited by the Examiner were presented in order to explain *why* the particular material is used. Thus, it is submitted that the "features" cited by the Examiner in item 7 of the Office Action are simply advantages obtained from the structure of the present invention clearly recited in original independent claim 14 (and now recited in each of amended independent claims 16-19), and therefore it was not necessary to incorporate these features into the independent claim. Nonetheless, in view of the interview with the Examiner, each of the independent claims 16-19 has been modified so as to clarify that the thread material will not react with oil additives of oil containing organic molybdenum *so as to suppress formation of a tribochemical reactive layer between the thread surfaces*. Consequently,

it is submitted that the arguments presented herewith are now clearly commensurate with the scope of the claims.

The Yamamoto reference discloses a valve lifter including a nut member 11 and an adjuster screw 13. However, as the Examiner acknowledged on page 3 of the Office Action, the Yamamoto reference does not disclose or even suggest that a pressure-side thread surface of one or both of the adjuster screw and the nut member is formed of a material that will *not react* with organic molybdenum. Thus, the Yamamoto reference also does not disclose or suggest a material that will suppress formation of a tribochemical reactive layer between the thread surfaces.

Nonetheless, the Examiner asserted that the Nakajima reference teaches that is conventional "in the art of aluminum alloy" to utilize an aluminum alloy with a coating of organic molybdenum without any reaction occurring between the organic molybdenum and the aluminum alloy. In other words, as clarified by the Examiner during the interview, the Examiner has cited the Nakajima reference as support for the proposition that materials exist that will not react with organic molybdenum.

However, as explained to the Examiner during the interview, and as emphasized in the above remarks, the *combination* of providing a lash adjuster with a nut member and an adjuster screw, and forming the pressure-side thread surface of the adjuster screw and/or the nut member of a material that will not react with oil additives of oil containing organic molybdenum provides significant benefits and is not suggested in the combination of prior art references applied by the Examiner. In other words, the Applicants are not asserting that lash adjusters including a nut member and an adjuster screw were previously unknown, and are not asserting that materials that will not react with organic molybdenum were previously unknown. Instead, the Applicants are asserting that forming the pressure-side thread surfaces of the adjuster screw and/or the nut member as recited in each of amended independent claims 16-19 is unique and not even suggested in the prior art references of record. The fact that two separate elements of an invention were taught in separate prior art references does not necessarily provide a basis for rendering an invention unpatentable, unless there is a motivation for combining the separate

teachings. For the reasons discussed in detail below, it is submitted that one of ordinary skill in the art would not be motivated by the Nakajima reference to modify the Yamamoto reference in the matter suggested by the Examiner.

Firstly, it is submitted that the Nakajima reference actually *teaches away* from the present invention. In particular, as explained in column 1, lines 30-43 of the Nakajima reference, one primary object of the Nakajima reference is to address the problem of “*insufficient* lubricity” in aluminum plates. In other words, a primary object of the Nakajima reference is to further *reduce* friction. As noted above, however, the purpose of forming the pressure-side thread surface of the adjuster screw and/or the nut member of a material that will not react with oil additives of oil containing organic molybdenum is to maintain a minimum friction coefficient so as to ensure smooth operation of the lash adjuster. In other words, the object of the present invention is to avoid an excessive reduction of friction between the thread surfaces. Thus, the object of the Nakajima is in direct contrast to the object of the present invention, and thus the Nakajima reference effectively *teaches away* from the present invention.

Secondly, as noted above, the Examiner asserted that the Nakajima reference “demonstrates that it is conventional *in the art of aluminum alloy*” (emphasis added) to use an aluminum alloy material that does not react with organic molybdenum. However, both the Yamamoto reference and the present invention are directed to the field of valves and, more particularly, to the field of valve lifters and lash adjusters. It is well established that, in order for an Examiner to rely on a reference in an obviousness rejection, the reference “must either be in the field of Applicants’ endeavor or, if not, the reasonably pertinent to the particular problem with which the inventor was concerned.” See *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). As noted above, the Examiner has acknowledged that the Nakajima reference is directed to the field of aluminum alloy materials, which is completely different than the field of valve lifters or lash adjusters.

As explained above, the Nakajima reference teaches away from the object of the present invention, and is directed to a field of art significantly different than that of the Yamamoto reference. Thus, one of ordinary skill in the art would not be motivated to use the teachings of

the Nakajima reference to modify the Yamamoto reference in order to obtain the present invention. Consequently, it is respectfully submitted that amended independent claims 16-19 are clearly patentable over the combination of the Yamamoto reference and the Nakajima reference.

Upon rejecting previously-presented dependent claims 16-19, the Examiner applied both the Yamamoto reference and the Nakajima reference in combination with one of the Anno reference or the Mizuno reference, and also applied the Lust reference and the Christini reference in rejections of other dependent claims. In this regard, the Anno reference is directed to a rotary anode type of X-ray tube, the Mizuno reference is directed to an electrically-driven switch operating mechanism, the Christini reference is directed to a method of diamond deposition in electroless plating, and the Lust reference is directed to a molding machine. Thus, none of these references is even remotely related to valve lifters and lash adjuster such as those in the Yamamoto reference and the present invention. Accordingly, it is submitted that one of ordinary skill in the art would not be motivated to combine any of these references with the Yamamoto reference for the purposes suggested by the Examiner in the Office Action.

Moreover, the Examiner repeatedly indicated throughout the Office Action that one of ordinary skill in the art would be motivated by the Anno reference, the Mizuno reference, the Lust reference, or the Christini reference to modify the Yamamoto reference so as to provide a *durable* valve lash adjuster. Of course, as explained in detail above, the purpose of forming the thread surfaces from the particular materials recited in the claims is to prevent excessive lowering of the friction coefficient between the thread surfaces. None of the references applied by the Examiner even suggest this feature. Therefore, in addition to the reasons discussed above as to why one of ordinary skill in the art would not be motivated to combine the Yamamoto reference and the Nakajima reference, it is further submitted that one of ordinary skill in the art would not be motivated to further modify the Yamamoto reference by using the Anode reference, the Mizuno reference, the Lust reference, or the Christini reference so as to obtain any of the invention recited in amended independent claims 16-19. Accordingly, it is respectfully submitted that amended independent claims 16-19, and the claims that depend therefrom, are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

Yoshiteru YASUDA et al.

By: 

W. Douglas Mahm
Registration No. 44,142
Attorney for Applicants

WDH/ck
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
July 18, 2005